

66858


SOV/76-33-11-13/47

On the Mechanism of High-temperature Cracking of Ethane

characteristic of cracking at 500-650°C does not occur. The reaction proceeds according to the first order, and the activation energy is 82 ± 2 kcal/mol. The reaction-rate constant of $\text{CH}_3 + \text{C}_2\text{H}_6 \rightarrow \text{CH}_4 + \text{C}_2\text{H}_5$ points to a steric factor of the order of 10^{-5} for this reaction, while the activation energy obtained from 12 ± 2 kcal is in agreement with data from other publications. The recombination constant, obtained both by experiment and by calculation using thermodynamic data, is approximately $5 \cdot 10^2$ times smaller than that obtained at lower temperatures. The decomposition rate constant of the ethyl radical is 10^3 times smaller than it would be according to the elementary kinetic gas theory. There are 4 figures, 3 tables, and 14 references, 8 of which are Soviet.

ASSOCIATION:

Akademiya nauk SSSR, Institut neftekhimicheskogo sinteza
(Academy of Sciences, USSR, Institute of Petroleum-chemical
Synthesis)



Card 2/2

5(4)

AUTHORS:

Brodskiy, A. M., Kalinenko, R. A., SOV/20-124-2-28/71
Lavrovskiy, K. P., Corresponding Member, AS USSR

TITLE:

On the Isotope Effect in the Cracking of Ethane (Ob izotopnom
effekte pri krekinge etana)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 2, pp 340-341
(USSR)

ABSTRACT:

The present paper deals with the intensity of the isotopic effect in the cracking of ethane marked by C^{14} . Different results obtained by previous papers are mentioned in short. The authors investigated the cracking of the mixture $C^{12}H_3 - C^{12}H_3$ and $C^{12}H_3 - C^{14}H_3$ at high temperatures. The decomposition mechanism of ethane is considerably more simple than that of propane. The experiments were carried out at a temperature of $\sim 850^\circ$ and at pressures of 50-80 torr according to an already previously (Refs 5,6) described method in a reactor with practically complete mixing. The results obtained by the experiments show the following: In a wide interval of degrees of transformation the activity of the produced ethylene does not differ from the activity of ethane

Card 1/3

On the Isotope Effect in the Cracking of Ethane

SOV/20-124-2-28/71

(accuracy $\sim 1\%$). The activity of methane is not equal to $A/2$ (as it would have to be in the case of lacking isotopic effect) but much lower. Here A is the activity of the ethane mixture existing when measurements were begun. A table contains the values of ethane activity in % of $A/2$ as function of the ethylene content in the cracked gas. Methane activity is lower by $\sim 10\%$ than $A/2$ and varies relatively little with progressing reaction. The value of the isotopic effect found is near that found previously (Refs 1,2) for propane. The data mentioned above all confirm (on the basis of ethane) the abnormally high value of the isotopic effect in the reaction of methane formation. The equality of the order of magnitude of the isotopic effect (with respect to methane) for C_2H_6 and C_3H_8 indicates the existence of similar ethanes in the formation of CH_4 in the two above-mentioned cases. Correction note: The provisional experiments carried out by the authors concerning the cracking of the ethane mixture $C^{12}H_3 - C^{12}H_3$ and $C^{14}H_3 - C^{14}H_3$ showed that in this case the isotopic effect (with respect to methane) is considerably

Card 2/3

On the Isotope Effect in the Cracking of Ethane

SOV/20-124-2-28/71

lower than in the cracking of $C^{12}H_3 - C^{14}H_3$. This confirms the above assumption that the abnormally high value of the isotopic effect in the cracking of ethane $C^{12}H_3 - C^{14}H_3$ is due to a quantum effect connected with the disturbance of symmetry. There are 1 table and 7 references, 4 of which are Soviet.

SUBMITTED: September 24, 1958

Card 3/3

5(4)

SOV/20-126-6-41/67

AUTHORS:

Brodskiy, A. M., Kalinenko, R. A., Lavrovskiy, K. P.,
Corresponding Member, AS USSR

TITLE:

On the Relation Between the Kinetic Isotopic Effects During
 $C^{12}-C^{14}$ and $C^{14}-C^{14}$ Bond Rupture (O sootnoshenii kineticheskikh
izotopnykh effektov pri razryve svyazey $C^{12}-C^{14}$ i $C^{14}-C^{14}$)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 6, pp 1293-1295
(USSR)

ABSTRACT:

The effects mentioned in the title were investigated under
conditions of high temperature cracking by means of a mixture of
 $C^{12}H_3-C^{12}H_3$ with $C^{14}H_3-C^{14}H_3$. The results were compared with

the cracking of $C^{14}H_3-C^{12}H_3$ as described in reference 1.

This experiment was made for the reason that hydrocarbons with
only partly marked C-atoms yielded higher values for the
isotopic effect (Refs 1-3) than could be expected according to
the present theoretical opinions (Refs 4, 5). The following is
given as a possible explanation of this phenomenon:

Card 1/3

On the Relation Between the Kinetic Isotopic Effects SOV/20-126-6-41/67
During $C^{12}-C^{14}$ and $C^{14}-C^{14}$ Bond Rupture

hydrocarbon molecules exhibit a plane of symmetry vertical to the chain or a corresponding alternating axis. The introduction of a marked C-atom has a disturbing effect upon this symmetry, and the transition from the symmetrical to the asymmetrical molecule might entail a considerable kinetic effect. Herefrom it resulted that the symmetrical ethanes $C^{12}H_3-C^{12}H_3$ and $C^{14}H_3-C^{14}H_3$ had to differ from asymmetrical

$C^{12}H_3-C^{14}H_3$ in their effect. The experimental data (Table 1) shows that the kinetic isotopic effect amounts to $5 \pm 1\%$ in the formation of methane from $C^{14}H_3-C^{14}H_3$; it is, therefore, considerably lower than the value of $12 \pm 2\%$ of reference 1 found for asymmetrical ethane. Measurements were made under entirely equal conditions. This result shows that there is no direct proportion between the kinetic isotopic effect and the reduced mass, and confirms the assumption that the disturbance of the

Card 2/3

On the Relation Between the Kinetic Isotopic Effects SOV/20-126-6-41/67
During $C^{12}-C^{14}$ and $C^{14}-C^{14}$ Bond Rupture

symmetry of the molecule has an effect upon the rate of reaction. Herefrom an indirect effect of various nuclear states upon the rate of molecular cracking reactions may be concluded. The authors thank N. D. Sokolov for valuable discussions. There are 1 table and 7 references, 4 of which are Soviet.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
(Institute of Petroleum-Chemical Synthesis of the Academy of Sciences, USSR)

SUBMITTED: April 10, 1959

Card 3/3

S/062/60/000/008/010/012
B004/B054

AUTHORS: Brodskiy, A. M., Lavrovskiy, K. P., and Filatova, Ye. D.
TITLE: High-temperature Dehydrogenation of Ethyl Benzene
PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk,
1960, No. 8, pp. 1490-1494

TEXT: The authors report on their investigations of the kinetics of dehydrogenation of ethyl benzene at temperatures between 660 and 740°C. They discuss data in publications (Refs. 2, 3), and explain contradictions by the fact that at high temperatures the styrene yield depends on the reaction period. To obtain a high styrene yield it was necessary to guarantee a short reaction period and a quick, steady heating. This was attained by means of a pseudoliquid coke powder layer. Fig. 1 shows the experimental arrangement. Heating was performed by a graphite spiral passed through by current. The ethyl benzene gasified and mixed with CO₂ or N₂ was introduced from below into the reaction tube (diameter 40 mm). 50 cm³ of coke (particle diameter 0.1 - 0.5 mm) were piled on a screen. CO₂ was admixed at the outlet of the reaction tube for a quick cooling and rarefaction of the

Card 1/3

High-temperature Dehydrogenation of Ethyl Benzene S/062/60/000/008/010/012
B004/B054

reaction product. The latter was collected in vessels cooled with liquid nitrogen. In the distillate, the styrene was determined by the iodine number, and the amount of the resulting benzene and toluene by fractionation. Table 1 lists the experimental results at 660, 690, 720, and 740°C and the reaction period τ . The styrene yield was 58% at 660°C and 70-75% at higher temperatures. Benzene and toluene yields were about 1-5% at 720°C, and 8-10% at 740°C. Replacement of the coke powder by quartz powder did not change the test results. Equation (6) is written down for evaluating the experimental data: $1/(1 - \pi) = 1 + k(\tau/\alpha)$, (π = styrene content of the distillate, k = reaction constant, α = coefficient of volume increase of the reacting gases). The graphic representation $1/(1 - \pi) = f(\tau)$ in Fig. 2 confirms the course of a first-order reaction. Hence, the reaction constant for the four test temperatures was calculated (Table 2). Fig. 3 shows the function $\ln k = f(1/T)$. The activation energy was found to be 44 ± 2 kcal/mole. There are 3 figures, 2 tables, and 8 references: 6 Soviet and 2 US. ✓

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
(Institute of Petroleum-chemical Synthesis of the Academy
of Sciences, USSR)

Card 2/3

High-temperature Dehydrogenation of Ethyl Benzene S/062/60/000/008/000/012
B004/B054

SUBMITTED: March 16, 1959

✓

Card 5/5

5(4)
AUTHORS:

Brodskiy, A. M., Kalinenko, R. A.,
Lavrovskiy, K. P.

S/076/60/034/01/031/044
B004/B007

TITLE:

A Method of Investigating the Mechanism of Fast Reactions in
a Turbulent Reactor by Means of Tagged Atoms 19

PERIODICAL:

Zhurnal fizicheskoy khimii, 1960, Vol 34, Nr 1, pp 192 - 195
(USSR)

ABSTRACT:

The term turbulent reactor is applied by the authors to a reactor vessel with an intense intermixing device. After giving a survey of the methods of investigating the kinetics of reactions and mentioning the isotopic method by M.B.Neyman, the authors explain the simplification of kinetic equations attained when using tagged atoms and by intensively intermixing the reagents as a result of the falling away of concentration- and temperature gradients. The method makes it possible to deal with both single processes in the reaction and also with the total process, and may therefore be used for the purpose of judging the correctness of the scheme upon which the reaction is based. By the example of the cracking of

Card 1/2

A Method of Investigating the Mechanism of Fast
Reactions in a Turbulent Reactor by Means of
Tagged Atoms

S/076/60/034/01/031/044
B004/B007

C_2H_6 at $800 - 900^\circ$ it is shown that by thoroughly intermixing,
linear dependence was obtained for the function $y = f(t)$
(Figs 1, 2). There are 2 figures and 6 Soviet references.



SUBMITTED: April 10, 1959

Card 2/2

S/195/60/001/003/002/013
B002/B058

AUTHORS: Brodskiy, A. M., Lavrovskiy, K. P., Su Vey-khan

TITLE: On the Kinetic Rules of High-temperature Cracking of Isopentane

PERIODICAL: Kinetika i kataliz, 1960, Vol. 1, No. 3, pp. 340 - 344

TEXT: The cracking of isopentane between 700 and 840°C was studied at a pressure of 110 ± 2 mm Hg. The reaction products were determined chromatographically. The following was determined for the constant of the cracking rate: 8.33 sec^{-1} at 540°C, 26 sec^{-1} at 760°C, and 95 sec^{-1} at 820°C. The activation energy is 60.5 ± 2 kcal/mole; the factor of the exponential function is 10^{14} sec^{-1} . At these temperatures, the cracking of isopentane proceeds as a first-order reaction. The self-braking of the reaction known at low temperatures was not observed at the experimental temperatures. The following summary scheme was drawn up for the decomposition mechanism: dehydrogenation of isopentane practically does

Card 1/3

On the Kinetic Rules of High-temperature
Cracking of Isopentane

S/195/60/001/003/002/013
B002/B058

not occur; the probability of the cracking reaction proceeding under formation of C_2 and C_3 chains is much greater than the probability of the formation of butylenes. The formation of β -butylene can be explained by the fact that during the cleavage of the C-C bond 3 or 4 hydrogen atom is more easily cracked from the secondary C atom than the primary hydrogen atom. The probability of the formation of γ -butylene is small in the cracking of isopentane, that is, if the C-C bond 1 is cleft, the hydrogen atom is cracked from the tertiary C atom and isobutylene forms. γ -butylene should be formed according to the radical chain mechanism. The relatively small amounts of γ -butylene in the cracking products indicate that the cracking reaction proceeds according to the mechanism of the molecular reaction. There are 3 figures, 1 table and 7 references: 5 Soviet, 1 British, and 1 US.

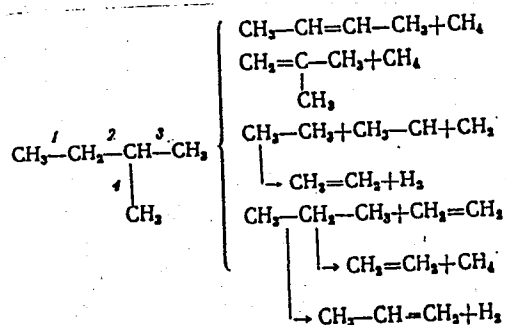
ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR (Institute of Petrochemical Synthesis AS USSR)

Card 2/3

On the Kinetic Rules of High-temperature
Cracking of Isopentane

S/195/60/001/003/002/013
B002/B058

SUBMITTED: February 23, 1960



Card 3/3

BRODSKIY, A.M.

54600

31669
S/607/61/003/000/002/002
E075/E185

AUTHORS: Topchiyev, A.V., Lavrovskiy, K.P., Polak, L.S.,
Brodskiy, A.M., and Kolbanovskiy, Yu.A.

TITLE: Investigation into the radiation chemistry of
petroleum hydrocarbons and the application of nuclear
irradiation in the petroleum refining industry and
petrochemical synthesis

SOURCE: International Petroleum Congress. 5th, New York, 1959
[Doklady] t. 3: Pererabotka nefi i gaza.
Neftekhimiya. Moscow, Gostoptekhizdat, 1961. 345-354.

TEXT: Liquid alkanes, mainly n-heptane, were subjected to
X-ray radiolysis. It was found that at room temperature the amount
of hydrogen, molecular weight and refractive index of the liquid
phase increase linearly with the irradiation. The amount of
methane increases depending on the proportion of CH₃ groups in the
molecule. UV spectra indicate the formation of polymers with
conjugated double bonds. The number of such bonds increases with
the number of CH₂ groups in the alkane molecules. It was shown
that the weight percent of the heavy residue increases

Card 1/4

Investigation into the radiation ...

31669
S/607/61/003/000/002/002
E075/E185

proportionally with the increasing doses of radiation. The molecular weight of the residue ranges from 175 to 218 and specific gravity 0.76 to 0.80 g/cm³. The radiolysis of n-heptane at -196 °C (in liquid nitrogen) gave products containing a marked proportion of free radicals as demonstrated by the examination of their paramagnetic spectra. At this low temperature free atoms of hydrogen are present for a considerable time, which opens new perspectives before petrochemical industry. The yield of the products of the recombination of C₇H₁₅ radicals at the low temperatures (giving various isomers of tetradecane) is halved compared with the yield obtained at 20 °C. The yield of the products obtainable by monomolecular reactions as well as the probability of transmission of the activation energy to other molecules decreases with temperature. In the case of catone UV absorption on irradiation at -79° and -196 °C is 4 times higher than that of catone treated at room temperature which indicated a rapid increase in the formation of dienes. The formation of polymers is slower. For the small doses of radiation a direct proportionality between the yields of gases and time of

Card 2/4

31669

Investigation into the radiation ... S/607/61/003/000/002/002
E075/E185

irradiation was observed. The addition of dibenzylsulphide to the alkanes prevented their radiolysis to a large extent. In the gaseous products of the radiolysis of the solution there is no H_2S , which suggests that a transmission of activation takes place. It was found that an important role during the irradiation of the alkanes is played by the process of direct rupture of carbon-carbon bond leading to the formation of alkyl radicals and final products (odd- and even-numbered carbon hydrocarbons). A study of the radiation and thermal stability of aromatic hydrocarbons was conducted by subjecting them to nuclear reactor irradiation at high temperatures. At the same time the thermal stability was controlled at 400 °C. It was shown that the thermal stability at 400 °C and radiation stability at 330 °C and irradiation dose of 1500 microrads are approximately the same. The introduction of methyl groups into the aromatic system leads to a marked decrease in the radiation stability. An increase of irradiation temperature from 220 to 330 °C accelerates the decomposition.

Card 3/4

Investigation into the radiation ... S/607/61/003/000/002/002
E075/E185

There are 6 figures, 5 tables and 7 references: 5 Soviet-bloc
and 2 non-Soviet-bloc. The English language references read as
follows: X

Ref.6: G.A. Freund. Nucleon, v.14, no.8, 62, 1956;
L.W. Fromm, K. Anderson. Nucl. Sci. Eng., 2(1), 160, 1956;
Colichman, E.L., Fish, R.F. Nucleon. v.15, no.2, 72, 1957;
E.L. Colichman, R.H. Gercke. Nucleon. v.14, no.7, 50, 1956.

Ref.7: R.O. Bolt, S.G. Carroll. Proceedings of the International
Conference on Peaceful Uses of Atomic Energy, Geneva, v.7,
8-20, 1955. United Nations, c. 550. N.Y., 1956.

Card 4/4

ROZHDESTVENSKAYA, T.B.; ZORIN, D.I.; BRODSKIY, A.M.

New design of a high-resistance six-decade potentiometer. Izv.
tekh. no.6:31-36 Je '61. (MIRA 14:5)
(Potentiometer)

S/204/62/002/004/006/019
E075/E436

AUTHORS: Lavrovskiy, K.P., Brodskiy, A.M., Musayev, I.A.,
Sanin, P.I., Rumyantsev, A.N., Filatova, Ye.D.,
Iskhakova, E.Kh.

TITLE: On the preparation of higher normal α -olefines by a
high speed cracking of paraffinic petroleum products

PERIODICAL: Neftekhimiya, v.2, no.4, 1962, 487-494

TEXT: Results are described of high speed cracking of soft and
hard paraffin waxes, slack wax from Bitkov crude and waxy residue
from Ozek - suat crude in a pilot plant. The plant was described
previously (Khim. nauka i prom-stv, v.2, no.2, 1957). The waxes
were heated to 900 - 1000°C and mixed with powdered coke preheated
to 600 - 730°C. They were fed into the reactor at the rate of
60 to 80 h⁻¹. The gases produced (23.0 to 47.4% by weight of
total products) contained 33.1 to 52.7% wt. ethylene. The fraction
of the liquid products from the slack wax boiling between 40 - 73°C
and 73 - 100°C contained heptene-1 as the main component. For the
hard wax cracking products, the fraction boiling up to 60°C
contained 49.80% α -olefines (main component), about 20% conjugated
dienes and 15 to 12% cyclenes. The content of α -olefines in
Card 1/2

S/204/62/002/004/006/019
E075/E436

On the preparation of higher ...

the 60 - 175°C fraction was 70.4% (13.6% hexene-1, 17.1% heptene-1, 15% octene-1, 11.9% nonene-1, 12.8% decene-1). In general it was shown that the benzene from the high speed cracking of paraffin waxes consisted mainly of α -paraffins, their content in benzenes from the cracking of slack wax and waxy residue being much lower. There are 11 tables.

ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR
(Institute of Petrochemical Synthesis AS USSR)

✓

Card 2/2

5.4300

31091

S/195/61/002/004/007/008

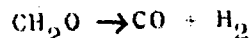
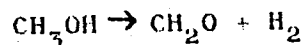
E030/E585

AUTHORS: Brodskiy, A. M., Kalinenko, R. A., Lavrovskiy, K. P.,
and Shevel'kova, L. V.

TITLE: Principles of the decomposition of methanol at high
temperatures

PERIODICAL: Kinetika i kataliz, v. 2, no. 4, 1961, 553-561

TEXT: Previous investigations of the decomposition of
alcohols from C₂ to C₄ postulated an approximately first-order
reaction, involving rupture of C-C or C-H bonds, but the yields
and mass balances of C, H, and O have disagreed by about 50% and
the activation energy for reaction velocity has been many times
smaller than that for pressure decrease in the system. Decomposi-
tion of methanol was considered by C. J. M. Fletcher (Ref. 6,
Proc. Roy. Soc., A147, 119, 1934) to be two-stage:



with similar discrepancies. The present work studied the reaction
Card 1/4

Principles of the decomposition

31091
S/195/61/002/004/007/008
E030/E585

at temperatures from 630 to 900°C and at pressures of 25 and 45 mm Hg with quartz and corundum as heat carriers. The pressure was maintained constant by a special valve, and the output of H_2 , CO and CH_4 were measured by adsorption on cooled active charcoal while the heavier gases were measured not only by condensation but also by subsequent chromatographic analysis over a charcoal column, using hydrogen as carrier gas. The concentration of CH_3OH varied with the form: $(CH_3OH)_0 / \alpha(CH_3OH) = 1 - kt$. (1)

where t is the time of reaction, $(CH_3OH)_0$ - the concentration CH_3OH in the initial mixture, (CH_3OH) - the current concentration of the alcohol, α - the coefficient of volume change of the gas as a result of the cracking. There is clearly a first-order system but it is heterogeneous, having an activation energy of 14.2 kcal/mole from 644-807°C and 40 kcal/mole up to 900°C. To verify the hypothesis that surface heat conduction dominated at lower temperatures, powdered corundum was introduced into the quartz reaction. A much higher activation energy was found and the output of CH_4 was increased fourfold and that of all hydrocarbon

Card 2/4

31091

Principles of the decomposition

S/195/61/002/004/007/008

E030/F585

gases twofold. In all cases the reaction products had significant concentration of C_2H_6 , CH_3OCH_3 , $C_2H_5OCH_3$, $C_2H_5OC_2H_5$, CH_3CHO , CH_3COCH_3 etc. signifying extensive free radical formation.

Moreover, thermodynamic data on the decomposition of methanol predict reaction velocities some two or three orders of magnitude less than observed, so one must be dealing in practice with the formation of free radicals by a highly developed chain reaction. To support this, high concentrations of ethylene were found (20-50% of ethane) and it is known that in the 654-734°C region there is insignificant cracking of methane; the only alternative plausible source is from recombination of CH_3 radicals.

V.V. Voyevodskiy is mentioned in the article for his contribution in this field. Acknowledgments are expressed to N.N. Naymushin for his assistance. There are 3 figures, 6 tables and 16 references.

5 Soviet-bloc and 11 non-Soviet-bloc. The four latest English-language references read as follows: Ref 1. J.A. Barnard,

H.W.D. Hughes, Trans Faraday Soc. 56 55 1960; Ref 2. Ibid. 56, 64, 1960; Ref 3. J.A. Barnard, Ibid. 56 72 1960; Ref 5. Ibid. 55 947, 1959.

Card 3/4

31091

Principles of the decomposition ... S/195/61/002/004/007/008
E030/E595

ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR
(Institute of Petrochemical Synthesis AS USSR)

SUBMITTED: February 15 1961

Card 4/4

11.1210

25321

S/020/61/138/005/021/025
B101/B231

AUTHORS: Brodskiy, A. M., Lavrovskiy, K. P., Corresponding Member
AS USSR, and Titov, V. B.

TITLE: Radiation-thermal cracking of liquid hydrocarbons

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 5, 1961, 1143-1146

TEXT: The present paper deals with the joint effect of high-energy radiation and heating on gasoil fractions which boil between 200 and 350°C. Experiments were made in evacuated quartz ampuls in a ВВР (VVR) reactor. The results shown in Fig. 1 disclose three sections. In section I, $\ln G$ is nearly independent of T . At a critical temperature, T_p , of about 600°K, G rises rapidly with an activation energy of 20 ± 5 kcal (section II), passing at last into thermal cracking (section III) if still higher temperatures are applied. The yield of highly molecular products begins to drop at T_p . These results are explained by superimposition of two processes. Hydrocarbon + radiation \longrightarrow \longrightarrow excited molecule \longrightarrow stable end products (1); Hydrocarbon + radiation \longrightarrow ... \longrightarrow thermal hydrocarbon

Card 1/4

25321

S/020/61/138/005/021/025
B101/B231

Radiation-thermal cracking of liquid...

radicals \rightarrow products of radical reactions (2). The processes (1) are temperature-independent, and supply a constant contribution to section I and II. The radicals of processes (2) are stable in section I and recombine again, whereas they dissociate in section II forming olefins and radicals of low molecular weight. A calculation of T_p is made at first for hydrocarbon gases. The following is put down: $k_d[R] \approx a_1 G_1 I$ (3), where $k_d = k_d^0 \exp(-E_d/RT_p)$ is the mean value of the radical destruction constant, $[R]$ the concentration of highly molecular thermal radicals which originate as a result of reaction (2), I the intensity of the radiation dose per unit volume; a_1 is a constant of the magnitude order 1. Furthermore, $IG_R - k_d[R] - k_T[R][\bar{R}] = 0$ (4), where $[\bar{R}]$ is the total concentration of radicals corresponding to $IG_R - k_T[\bar{R}]^2 = 0$ (5). (G_R is the radiation chemical yield of radicals according to (2), $G_{\bar{R}}$ the total yield of radicals). From (4) and (5) can be deduced: $T_p = E_d / R \ln(k_d^0 b / \sqrt{k_T IG_R})$ (6). The temperature-independent constant $b = (1 - a_1 G_1 / G_R) > 0$ is ~ 1 , and can be

Card 2/4

Radiation-thermal cracking of liquid... ²⁵³²¹

S/020/61/138/005/021/025
B101/B231

neglected. Substituting $G_{\bar{R}} \sim 5$ (per 100 ev); $k_T = 10^{-11}$ cm³/mole.sec;
 $E = 25-30$ kcal/mole results in $T_p = 600^\circ K$ in accordance with the experiment.
According to Refs. 8 and 9 (see below), the cellular effect is taken into
consideration for liquid hydrocarbons, and put down

$G_{\bar{R}, I} - 1/\tau_T [\bar{R}'] - k_d [\bar{R}'] = 0$ (7) and $1/\tau_D [\bar{R}'] - k_d [\bar{R}'] - k_T [\bar{R}]^2 = 0$ (8), where
 $[\bar{R}']$ is the number of radicals in the unit volume being placed in a cell
adjacent to such radicals as they have simultaneously originated with,
 $[\bar{R}']$ the concentration of highly molecular radicals which diffused out of
the cell, τ_T the time required for the diminution of $[\bar{R}']$ to the $1/e$ fold
owing to recombination, τ_D the diffusion period. The processes (1) can

here be neglected, and obtained is $G_{olef I} = k_d [\bar{R}] = k_d ([\bar{R}'] + [\bar{R}''])$
 $\simeq (k_d + 1/\tau_D) G_{\bar{R}, I} (1/\tau_T + k_d)^{-1}$ (9). The following holds for the passing
from section I to section II: $k_d = k_d^0 \exp(-E_d/RT_p) \simeq 1/\tau_D$ (10). Assuming
that $E = 20$ kcal/mole, $k_d^0 = 10^{13}$ sec⁻¹, $1/\tau_D = D/d^2$, where d is the cell

Card 3/4

25321
Radiation-thermal cracking of liquid...

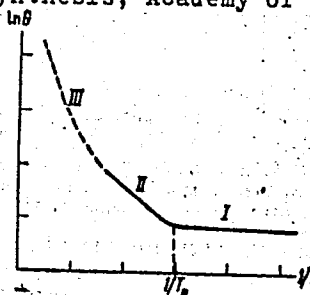
S/020/61/138/005/021/025
B101/B231

dimension, $T_p = 600^\circ\text{K}$, $D = 10^{-5} \text{ cm}^2/\text{sec}$ $d = 10^{-6} \text{ cm}$ is found. The cellular effect has thus a remarkable influence on the radiolysis of liquid hydrocarbons. L. S. Polak and M. A. Mokul'skiy are mentioned. There are 3 figures and 9 references: 5 Soviet-bloc and 4 non-Soviet-bloc. The two most important references to English-language publications read as follows: Ref. 8: E. Rabinovitch, Trans. Farad. Soc., 33, 1225 (1937); Ref. 9: B. Williamson, V. K. La Mer, J. Am. Chem. Soc., 70, no. 2, 717 (1948).

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
(Institute of Petrochemical Synthesis, Academy of Sciences USSR)

SUBMITTED: February 18, 1961

Fig. 1: Schematic representation of the function $\ln G = F(1/T)$; T_p = critical point.



Card 4/4

27256
S/020/61/139/005/006/021
B104/B201

5.4600

AUTHORS: Brodskiy, A. M., and Kolbanovskiy, Yu. A.

TITLE: Inhibition of radiolysis

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 5, 1961, 1081-1084

TEXT: A study has been made of inhibition effects of the radiolysis of organic systems by small admixtures of impurities. These effects can be regarded as a consequence of the direct transmission of an excitation to the impurity molecules. On the basis of Fig. 1, where a molecule excited by irradiation is indicated by II, and a molecule of the inhibitor is indicated by I, the following relation is obtained for the matrix element of the effective excitation energy which corresponds to a transition of II to the ground state and to a photon-induced excitation of I without emission:

$$U_{i \rightarrow f} = \int (j_{\alpha II}(\vec{r}_{II}))_{fi} \frac{e^{i\omega(|\vec{r}_I - \vec{r}_{II}|)}}{|\vec{r}_I - \vec{r}_{II}|} (j_{\alpha I}(\vec{r}_I))_{fi} (dr_I) (dr_{II}) \quad (3)$$

Card 1/5

27256

S/020/61/139/005/006/021
B104/B201

Inhibition of radiolysis

This integral is integrated over the entire space; $(j_{\alpha_i})_{fi}$ ($i=I,II$) are the matrix elements of the flow vector corresponding to the transitions investigated here and differing from zero in the regions I and II. Using results of other authors (D. R. Kalkwarf, *Nucleonics*, 18, no. 5, 76 (1960); Yu. A. Kolbanovskiy et al., *Tezisy dokl. na II Vesoyuzn. soveshch. po radiatsion. khim.*, M., 1960; A. I. Akhiyezer et al., *Kvantovaya elektrodinamika*, 1953), the equation

$$U_{i \rightarrow f} = \frac{\omega^2 e^{i\omega R}}{R} \left\{ 1 - \frac{2}{i\omega R} + \frac{3}{2(i\omega R)^2} \right\} (D_{Io})_{fi} (D_{IIo})_{fi} \text{ is obtained. It}$$

follows that the probability of a process investigated here per unit time

$$\begin{aligned} \text{reads: } W_{if} &= \int 2\pi |U_{i \rightarrow f}|^2 \delta(E_{fI} - \omega) \rho(E_{fI}) dE_{fI} \\ &= 2\pi \frac{\omega^4}{R^2} \left(1 + \frac{1}{(\omega R)^2} + \frac{9}{4(\omega R)^4} \right) \rho(\omega) (D_{Io})_{fi}^2 (D_{IIo})_{fi}^2 \end{aligned} \quad (14)$$

the energy of the ground state E_{iI} of the inhibitor being put equal to

Card 2/5

27256

S/020/61/139/005/006/021
B104/B201

Inhibition of radiolysis

zero. To estimate W_{if} it is suitable to express (14) by the probabilities W_I and W_{II} for dipole radiation of the excited molecules I and II. The ratio W_{if}/W_I is found to remain sufficiently high if the level density $\rho(\omega)$ is high, and W_{II} is small. In addition, the rate of radiolysis inhibition as a function of the inhibitor concentration is studied. The following relation is obtained for the mean probability of inhibition in

the medium:
$$W \approx \int_{R_1}^{R_2} W_{if}(\vec{R}) C_i(d\vec{R}) = AC_i^{2/3} (1 + \alpha_1 C_i^{2/3}/\omega^2 + \alpha_2 C_i^{4/3}/\omega^4).$$

C_i is the inhibitor concentration, and A is independent of it; α_1 and α_2 are numerical coefficients of the order of unity. A comparison with experimental results of other authors (S. Lipsky et al., Rad. Res., 8, 203 (1958)) shows this relation to give a correct description of the course of radiolysis inhibition in a wide range of variation of C_i , which contains the so-called saturation range. V. G. Levich and L. S. Polak are thanked for having participated in discussions. There are 2
Card 3/5

Inhibition of radiolysis

27256
S/020/61/139/005/006/021
B104/B201

figures and 9 references: 3 Soviet and 6 non-Soviet. The references to English-language publications read as follows: S. Lipskiy, M. Burton, J. Chem. Phys., 26, 1337 (1957); T. J. Hardwick, J. Chem. Phys., 65, 101 (1961); G. R. Frieman, Canad. J. Chem., 38, 1043 (1960); Nuclear Eng., 5, no. 47, 59 (1960).

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
(Institute of Petrochemical Synthesis of the Academy of Sciences, USSR)

PRESENTED: March 29, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: March 23, 1961

Card 4/5

BRODSKIY, A. M.

16

PHASE I BOOK EXPLOITATION

SOV/6177

Akademiya nauk SSSR. Institut neftekhimicheskogo sinteza

Radioliz uglevodorodov; nekotoryye fiziko-khimicheskiye problemy
(Radiolysis of Hydrocarbons; Some Physicochemical Problems)
Moscow, Izd-vo AN SSSR, 1962. 207 p. Errata slip inserted.
5000 copies printed.

Resp. Eds.: A. V. Topchiyev, Academician, and L. S. Polak,
Doctor of Physics and Mathematics; Ed.: L. T. Bugayenko;
Tech Ed.: Ch. A. Zentsel'skaya.

PURPOSE: This book is intended for physical and industrial chemists
interested in the properties and behavior of irradiated hydro-
carbons.

COVERAGE: The book gives a systematic presentation of the results
of research on the radiolysis of hydrocarbons carried out from
1957 through 1961 at the Laboratory of Radiation Chemistry,
Institut neftekhimicheskogo sinteza AN SSSR (Institute of Petro-

Card 1/4

Radiolysis of Hydrocarbons (Cont.)

807/6177

chemical Synthesis, Academy of Sciences USSR). Although the results were obtained for individual compounds, they may be generalized and applied to other members of the same homologous series. The following persons participated in making the experiments and in writing the text: V. G. Beryoskin, V. B. Glushnev, Yu. A. Kolbanovskiy, I. M. Kustanovich, V. D. Popov, A. Ya. Tamkin, V. D. Timofeyev, N. Ya. Chernyak, V. A. Shalchray, E. B. Shlikhter, A. S. Sheherbakova, B. M. Nogodov, A. Z. Poryabkina, M. N. Rytova, T. A. Tgina, Yu. B. Emin, A. M. Efodskiy, V. V. Vovodskiy, P. Ya. Glazunov, B. A. Smirnova, and Yu. L. Khait. References, mainly Soviet and English, follow individual chapters.

TABLE OF CONTENTS [Abridged]:

Foreword	3
Ch. I. Physicochemical Characteristics of Hydrocarbon Radiolysis	5
Card 2/4	

15203
S/844/62/000/000/049/129
D287/D307

11.0130

AUTHORS: Brodskiy, A. M., Lavrovskiy, K. P. and Titov, V. B.

TITLE: Radiation-induced thermal cracking of kerosene-gas oil fractions

SOURCE: Trudy II Vsesoyuznogo soveshchaniya po radiatsionnoy khimii. Ed. by L. S. Polak. Moscow, Izd-vo AN SSSR, 1962, 295-303

TEXT: The present work is a continuation of an earlier investigation with the difference that thermal cracking of petroleum fractions was replaced by radiolysis of the kerosene-gas oil fraction in the liquid phase, the fraction containing relatively large quantities of naphthenes and aromatic hydrocarbons. The gas oil was purified before the process of hydrostabilization. The experiments were carried out both under static conditions (at 100 - 450°C, 150 - 200 megarad) and under dynamic conditions (at temperatures of 300°C and 315°C, 3 - 5 atm pressures and 100 megarad). In the absence of radiation hardly any thermal cracking could be observed under either

Card 1/3

Radiation-induced thermal ...

S/844/62/000/000/049/129
D287/D507

of these conditions at the given temperatures (except at 450°C). Pure gas oil fractions as well as fractions containing $(1 \pm 0.2) \times 10^{-3}$ M inhibitors (tetraphenylbutadiene and terphenyl) were tested under static conditions. Under dynamic conditions in circulation reactors, marked changes in the rate and direction of radiolysis conversions could be observed at ~310°C and at temperatures above 300 - 330°C radical decomposition reactions proceeded at considerable rates, with a cleavage of the C-C bond; the CH₄ content in the gaseous products increased whilst the H₂ content decreased. Activation energies are calculated. The yield of products was found to vary linearly with the dosage (up to 100 megarad), slight deviations during the initial stages being due to gaseous products being dissolved in the gas oil. Investigations on the relationship between the radiolysis yield of the high-boiling residue and 1/T have proved that the yield increased slightly at 100 - 300°C and began to decrease at 300 - 450°C. Investigations of the chemical composition of liquid products under dynamic conditions have indicated that the percentage of naphthenic and unsaturated compounds increased slightly.

Card 2/3

Radiation-induced thermal ...

S/844/62/000/000/049/129
D287/D307

ly with increasing dose whilst the percentage of paraffins and aromatics had decreased. Addition of inhibitors decreased the yields of gaseous products, and of the high-boiling residue by 20 - 30%. There are 6 figures and 5 tables.

ASSOCIATION: Institut neftekhimicheskogo sinteza, AN SSSR (Institute of Petrochemical Synthesis, AS USSR)

Card 3/3

5.4600

S/204/62/002/001/005/007
I032/I232

AUTHORS: Brodskiy, A. M., Kolbanovskiy, Yu. A., Polak, L. S.

TITLE: On energy transfer during radiolysis of hydrocarbons

PERIODICAL: Neftekhimiya, v. 2, no. 1, 1962, 54-67

TEXT: This is a theoretical treatment of previous experimental work on inhibition of radiolysis of non-polar, non-associated organic compounds in the liquid phase by the admixture of small amounts (10^{-2} to 10^{-5} mole/l) of inhibitors, usually aromatic compounds or iodine. A model for the inhibition mechanism is proposed, based on electromagnetic interaction between the excited molecules of the substance subjected to radiolysis (energy donor) and the molecules of the inhibitor (energy acceptor). A relationship between the inhibition probability and the concentration of the inhibitor is derived, according to which the former is proportional to the $2/3$ -th power of the latter. This relationship is valid for inhibitor concentrations lower than 10^{-2} mole/l. The relationship between the inhibition effect and the character of the excitation spectra of the molecules involved is considered. There are 9 figures.

ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR (Institute of Petrochemical Synthesis, AS USSR)

SUBMITTED: November 20, 1961

Card 1/1

✓B

BRODSKIY, A.M.; LABROVSKIY, K.P.; MAKAROV, D.V.; MEZENTSEV, A.N.; FISH,
Yu.L.

Radiation-thermal cracking of gas oil. Neftekhimiia 2 no.3:
332-338 My-Je '62. (MIRA 15:8)

1. Institut neftekhimicheskogo sinteza AN SSSR.
(Cracking process) (Petroleum products)

LAVROVSKIY, K. P.; BRODSKIY, A. M.; MUSAYEV, I. A.; SANIN, P. I.;
RUMYANTSEV, A. N.; FILATOVA, Ye. D.; ISKHAKOVA, E. Kh.

Preparation of higher normal α -olefins by the high-speed
cracking of paraffin petroleum products. Neftekhimia 2 no.4:
487-494 J1-Ag '62. (MIRA 15:10)

1. Institut neftekhimicheskogo sinteza AN SSSR.

(Olefins) (Petroleum products)
(Cracking process)

S/020/62/144/004/018/024
B101/B138

AUTHORS:

Brodskiy, A. M., Kalinenko, R. A., Lavrovskiy, K. P.,
Corresponding Member AS USSR, and Shevel'kova, L. V.

TITLE:

Mechanism of by-product formation in high-temperature
cracking of ethane

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 4, 1962, 817-820

TEXT: Following previous papers and using techniques described therein (ZhFKh, 33, no. 11 (1959); ibid., 34, no. 1 (1960)) the formation of CH_4 , C_2H_2 , C_3H_8 , C_3H_6 , C_4H_{10} , C_4H_8 , and C_4H_6 during the cracking of ethane at 800-880°C and 90 ± 3 mm Hg with additional 0.45% of ethylene tagged by C^{14} was examined. Corundum or ground quartz was used as a heat carrier. The reaction products were separated by chromatography and their radioactivity was measured. Results: (1) CH_4 showed low activity, indicating that it is formed mainly from C_2H_4 of low activity and from transformation products thereof. About one-half of the CH_4 is formed without the participation of

Card 1/3

S/020/62/144/004/018/024
B101/B138

Mechanism of by-product formation ...

CH_3^* by the decay of high-molecular products. (2) The equal degree of activity exhibited by C_2H_2 and C_2H_4 indicates that C_2H_2 is formed with the participation of a C_2H_4 molecule. (3) C_3H_8 and C_4H_{10} had a low content of C^{14} . They are formed by recombination of weakly active CH_3 and C_2H_5 radicals. (4) C_3H_6 and C_4H_8 showed the same activity as C_2H_4 . They are not formed from C_3H_8 and C_4H_{10} , respectively, but mainly by the disintegration of C_4H_9 and, at temperatures $< 880^\circ\text{C}$, also by C_2H_3 recombining with CH_3 or C_2H_5 . (5) The fact that C_4H_6 (divinyl) is twice as active as C_2H_4 justifies the supposition that it is formed with the participation of 2 molecules of C_2H_4 . As $[\text{C}_4\text{H}_6]$ is larger than corresponds to the equilibrium concentration in the reaction $\text{C}_4\text{H}_6 \rightleftharpoons \text{C}_2\text{H}_2 + \text{C}_2\text{H}_4$, a complex reaction involving free radicals is assumed. (6) The specific activity of the coke at 880°C amounted to one-half the activity of C_2H_4 . At this

Card 2/3

Mechanism of by-product formation ...

S/020/62/144/004/018/024
B101/B138

temperature it is produced from highly active, unsaturated hydrocarbons. At lower temperatures the coke was much less active, implying that this is the point at which the interaction of unsaturated and condensed hydrocarbons with weakly active alkyl radicals begins to predominate. There are 2 tables. The English-language reference is: C. G. Danby, B. C. Spall et al., Proc. Roy. Soc., A218, no. 1135, 450 (1953).

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
(Institute of Petrochemical Synthesis of the Academy of
Sciences USSR)

SUBMITTED: February 27, 1962

Card 3/3

X

L 10701-63 EPR/ENP(j)/EPF(c)/EPF(n)-2/ENT(m)/BDS--AFFTC/ASD/APGC/SSD--
 PS-l/PC-l/Pr-l/Pa-l--RM/RM/MN
 ACCESSION NR: AP3002019 S/0195/63/004/003/0337/0347

AUTHOR: Brodskiy, A. M.; Lavrovskiy, K. P.; Titov, V. B.

TITLE: Radiation transformation rate of hydrocarbons as a function of temperature

SOURCE: Kinetika i kataliz, v. 4, no. 3, 1963, 337-347

TOPIC TAGS: radiation decomposition, liquid hydrocarbon, radiation-thermal cracking, nuclear reactor, hydrocarbon radiolysis

ABSTRACT: Authors examine the rate of radiation decomposition of liquid hydrocarbons as a function of temperature. Detailed experimental data concerning the radiation-thermal cracking of a mixture of petroleum hydrocarbons - directly distilled gas oil in a nuclear reactor is shown. These data made it possible to determine basic characteristics of a change in the rate and direction of radiolysis of the hydrocarbons with a rise in temperature, which are of a theoretical and practical interest at the present time. "The authors wish to thank A. Kh. Eglit for his help in this study." Orig. art. has: 7 equations, 5 figures, and 4 tables.

Card 1/2

Inst. of Petrochemical Synthesis

BRODSKIY, A.M.; LAVROVSKIY , K.P.

On the temperature limit for the effect of radiation on the rate
of chemical transformations. Kin. i kat. 4 no.4:652-653 JI-Ag
'63. (MIRA 16:11)

1. Institut neftekhimicheskogo sinteza AN SSSR.

L 10191-63

KPF(o)/KPF(n)-2/BDS--AFFTC/ASD/SSD--Pr-4/Pu-4

ACCESSION NR: AP3000057

S/0056/63/044/005/1612/1617

AUTHOR: Brodskiy, A. M.

63

TITLE: Conditions of formation of μ sup + mesic molecules. 9

61

SOURCE: Zhurnal eksper. i teoret. fiziki, v. 44, no. 5, 1963, 1612-1617

TOPIC TAGS: μ -mesic molecules, muonium

ABSTRACT: The rates of μ sup + mesic molecule formation are determined in the gaseous and condensed phases of several organic molecules, and the minimum temperatures for the experimental observation of μ sup + mesic molecules are calculated. It is assumed that the positive muons in a medium capture electrons long before they can decay and are transformed into muonium, that the muonium is then thermalized, and that the electronic structure of muonium resembles that of hydrogen. The third assumption is obvious while the other two are confirmed qualitatively for sufficiently dense media by radio chemical experiments with hot hydrogen atoms. The muonium reaction rate constants are not calculated directly, but are determined from corresponding experimental data for hydrogen

Card 1/2

L 10191-63
ACCESSION NR: AP3000057

2
reactions. Account is taken also of the tunnel effect, whose role becomes more important because of the relatively small muonium mass. The experimental conditions for the expected formation of μ sup + mesic molecules and μ sup + mesic radicals are determined and a possible observational procedure is indicated. "The author wishes to thank V. I. Gol'danskiy for comments." Orig. art. has: 15 formulas, 2 tables, and 1 figure.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR (Institute of Petroleum Synthesis, Academy of Sciences SSSR)

SUBMITTED: 07Dec62 DATE ACQ: 12Jun63 ENCL: 00
SUB CODE: PH NR REF SOV: 007 OTHER: 004

bm/Ch
Card 2/2

BRODSKIY, A.M.

Representation of the imaginary parts of amplitudes for many-particle intermediate states, Dokl. AN SSSR 148 no.6:1275-1278 F '63.
(MIRA 16:3)

1. Institut neftekhimicheskogo sinteza AN SSSR. Predstavleno
akademikom N.N.Bogolyubovym.
(Scattering (Physics)) (Functions)

BRODSKIY, A.M.; TEMKIN, A.Ya.

On the resonance theory of chemical reaction rates. Dokl. AN SSSR
152 no.1:127-130 S '63. (MIRA 16:9)

1. Institut neftekhimicheskogo sinteza AN SSSR. Predstavleno
akademikom Ya.B.Zel'dovichem.

(Chemical reaction, Rate of)

TIMKIN, V.N.; LAVROVSKIY, K.P.; BRODSKIY, A.M.; RUMYANTSEV, A.N.

Kinetics of the dimerization of the cyclopentadiene contained in gasoline distillates from the high-temperature pyrolysis of petroleum products. Neftekhimia 4 no.3:435-440 My-Je '64.

(MIRA 18:2)

1. Institut neftekhimicheskogo sinteza AN SSSR im. A.V.Topchiyeva.

YAMPOL'SKIY, Yu.P.; BRODSKIY, A.M.; KALINENKO, R.A.; LAVROVSKIY, K.P.

Conversions of ethylene at high temperatures. Neftekhimiya 4 no.5:691-
699 S-O '64. (MIRA 18:1)

1. Institut neftekhimicheskogo sinteza imeni A.V.Topchiyeva AN SSSR.

L 51813-65 EWT(m)/EPT(c)/ENP(j)/T Pc-4/Pr-4 WE/RM

ACCESSION NR: AP5017012

UR/0204/64/004/006/0880/0887

AUTHOR: Brodskiy, A.M.; Lavrovskiy, K. P.; Rumyantsev, A. N.; Timkin, V. H.;
Fish, Yu. L.TITLE: Production of higher alpha-olefins by the method of high-speed contact
cracking of paraffinic petroleum products

SOURCE: Neftekhimiya, v. 4, no. 6, 1964, 880-887

TOPIC TAGS: petroleum refining, petroleum refinery product, paraffin wax

ABSTRACT: The high-speed contact cracking of soft wax and other paraffinic petroleum products was investigated on semiindustrial and pilot-plant installations. The primary decomposition products were found to be alpha-olefins (pentene-1, hexene-1, heptene-1, octene-1, nonene-1). They were isolated by fractional distillation of the alpha-olefin fraction. The olefin content in the fraction of high-speed cracking of soft wax boiling below 150° was 70-75%. The products of high-speed cracking of solid wax and paraffinic crude, boiling within the range 200-250°, contained up to 85% unsaturated compounds, chiefly alpha-olefins. In a study of high-speed cracking of soft wax on the semiindustrial installation of the Moscow Neftegaz Plant, the necessary indices of the process were determined. The high concentration of alpha-olefins in the products of high-speed

Card 1/2

L 51813-65

ACCESSION NR: AP5017012

speed cracking permit the isolation of narrow fractions containing up to 95% of the individual alpha-olefins by fractional distillation. Orig. art. has: 3 formulas, 1 graph, 6 tables.

ASSOCIATION: Institut neftekhimicheskogo sinteza im. A. V. Topchiyeva AN SSSR
(Institute of Petro-Chemical Synthesis AN SSSR)

SUBMITTED: 12Mar64

ENCL: 00

SUB CODE: FP

NR REF SOV: 010

OTHER: 006

JPRS

Card 2/2

BRODSKIY, A.M.; KOLBANOVSKIY, Yu.A.; POLAK, L.S.

Concerning the remarks on articles by IU.A. Kolbanovskii, A.M. Brodskii, L.S. Polak on the mechanism of radiolysis inhibition. Kin. i kat. 5 no.2:360-364 Mr-Ap '64.

(MIRA 17:8)

1. Institut neftekhimicheskogo sinteza AN SSSR imeni A.V. Topchiyeva.

BRODSKIY, A.M.; IVANENKO, D.D.

Theory of nonrelativistic scattering of compound particles. Izv.
vys. ucheb. zav.; fiz. 7 no.6:130-135 '64.

(MIRA 18:2)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.

BRODSKIY, A.M.; LAVROVSKIY, K.P.; TITOV, V.B.; EGLIT, A. Kh.

Radiation-thermal transformations of normal alkanes in the
liquid phase. Dokl. AN SSSR 159 no.6:1319-1322 D '64
(MIRA 18:1)

1. Institut neftekhimicheskogo sinteza im. A.V. Topchiyeva.
2. Chlen-korrespondent AN SSSR (for Lavrovskiy).

L 62082-65 EPP(c)/EPP(n)-2/ENG(j)/EWA(h)/EWP(j)/EWT(m)/EWA(l) Po-L/Pr-L/Pu-L/Peb
 UR/0204/65/005/003/0351/0362
 ACCESSION NR: AP5016839 GG/RM 547.21-14:541.15:542.92

AUTHORS: Brodskiy, A. M.; Lavrovskiy, K. P.; Tutov, V. B.; Eglit, A. Kh.

TITLE: On the mechanism of radiation-thermal transformations of n.alkanes in liquid phase

SOURCE: Neftekhimiya, v. 5, no. 3, 1965, 351-362

TOPIC TAGS: alkane, radiolysis, liquid phase, temperature relationship

ABSTRACT: The temperature relation of the radiation-thermal destruction of liquid hydrocarbons (normal paraffin $C_{34}H_{70}$) in the mixed nuclear radiation field was studied in the temperature interval 150-400C in an effort to obtain more specific evaluations of hydrocarbon radiolytic decomposition and to evaluate the radical concentrations. At 150 and 250C the quantities of the liquid radiolysis products were too small for the yield determination; their content of gases and vapor at various temperatures is tabulated. The yields of different products at temperatures of 150, 260, and 380C with respect to the number of C atoms in the molecule are presented graphically. Proceeding from the balance equation for the quasi-stationary concentrations of iso- and normal radicals inside and outside a wet cell, the equations

Card 1/2

L 62082-65

ACCESSION NR: AP5016839

for the yield of lower saturated and unsaturated hydrocarbons are derived. They show that the strong temperature dependence of both hydrocarbon types was determined by the isoradical decomposition outside the wet cell and was proportional to the constant of the reaction velocity of isoradical destruction (both processes had equal activation energies). These equations were used also for the evaluation of the pre-exponential factor of the reactions of alkyl radical decomposition in fluid. The evaluation of different radical concentrations in and outside the cell showed that the destruction of the C-C bonds prevailed during the primary radiation effect with a simultaneous formation of primary (normal) radicals in the cell, while the hydrocarbon radicals outside the cell consisted of secondary radicals formed from the normal ones through the replacement reactions. Orig. art. has: 3 tables, 4 figures, and 6 formulas.

ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR im. A. V. Topchiyeva
(Institute of Petrochemical Synthesis, AN SSSR)

SUBMITTED: 17Jul64

ENCL: 00

SUB CODE: 00,62

NO REF SOV: 012

OTHER: 008

Card 2/2

SHEVEL'KOVA, L.V.; BRODSKIY, A.M.; KALINENKO, R.A.; LAVROVSKIY, K.P.

Mechanism underlying the formation of secondary products in the
high-temperature cracking of ethane. Dokl. AN SSSR 160 no.2:
409-412 Ja '65. (MIRA 18:2)

1. Institut neftekhimicheskogo sirteza im. A.V. Topchiyeva
AN SSSR. 2. Chlen-korrespondent AN SSSR (for Lavrovskiy).

BRODSKIY, A.M.; KALINENKO, R.A.; LAVROVSKIY, K.P.; SHEVEL'KOVA, L.V.;
YAMPOL'SKIY, Yu.P.

Regularities in the transformations of ethylene and acetylene
during high-temperature decomposition of hydrocarbons. Dokl. AN
SSSR 163 no.4:920-923 Ag '65. (MIRA 18:8)

1. Institut neftekhimicheskogo sinteza im. A.V.Topchiyeva AN SSSR.
2. Chlen-korrespondent AN SSSR (for Lavrovskiy).

BRODSKIY, A.M.; KHAMIN, N.A.

Cutter with a plastic holder. Mashinostroitel' no.7:26 J1 '65.
(MIRA 18:7)

SHEVEL'KOVA, L.V.; EROSKAY, A.M.; KALINENKO, R.A.; LAVROVSKIY, K.P.

Mechanism of the formation of some secondary products in the high-temperature cracking of ethane. Kin. i kat. 6 no.4:592-600 Ji-Ag '65. (MIRA 18:9)

1. Institut neftekhimicheskogo sinteza imeni A.V.Torzhnyeva AN SSSR.

L 10689-66 EWT(m)/T/EWP(j) RPL WW/WE/RM

ACC NR: AP5028623

SOURCE CODE: UR/0030/65/000/010/0040/0045

AUTHOR: Brodskiy, A. M. (Doctor of chemical sciences)

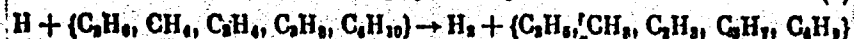
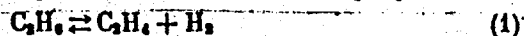
ORG: Institute of Petrochemical Synthesis im. A. V. Topchiyev, Academy of Sciences, SSSR (Institut neftekhimicheskogo sinteza Akademii nauk SSSR)

TITLE: Determination of the kinetic scheme of ethane pyrolysis

SOURCE: AN SSSR. Vestnik, no. 10, 1965, 40-45

TOPIC TAGS: ethane, pyrolysis, chemical kinetics, chemical labelling

ABSTRACT: The article reports the principal results of kinetic studies conducted at the chemical engineering laboratory of the Institute of Petrochemical Synthesis im. A. V. Topchiev, Academy of Sciences, SSSR (laboratoriya khimicheskoy tekhnologii Instituta neftekhimicheskogo sinteza im. A. V. Topchiyeva Akademii nauk SSSR), aimed at determining the relationships governing the chemical conversions in the high-temperature cracking of ethane. A special method of studying the mechanism of fast reactions in a turbulent reactor involving the use of C^{14} was used to determine the rate constants of the processes and the steps of the reactions. The following scheme of reactions by which the pyrolysis products are formed is proposed:

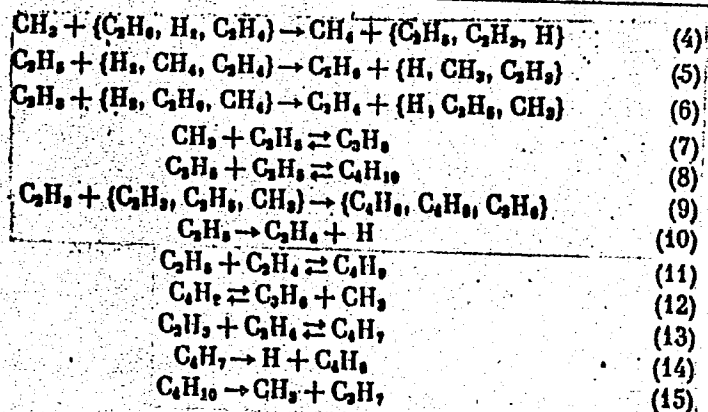


Card 1/2

UDC: 66.092:547.212

L 10689-66

ACC NR: AP5028623



For brevity, groups of reactions the differences in the rate constant of which are relatively small have been lumped together in the scheme. In addition, a number of reactions not contributing appreciably to the formation of the cracked products have been disregarded. It is concluded that the present state of knowledge in this field permits a satisfactory mathematical description of the pyrolysis of ethane. Orig. art. has: 1 figure and 16 formulas.

SUB CODE: 07 / SUBM DATE: none / ORIG REF: 006 / OTH REF: 004

Hw
Card 2/2

3

L 8508-68 EWT(m)/ENP(j)/T RPL WW/WE/RM
 ACC NR: AP5028491 SOURCE CODE: UR/0286/65/000/020/0066/0066

AUTHORS: Sirota, A. G.; Ryabikov, Ye. P.; Chopko, L. F.; Lavrovskiy, K. P.;
 Brodskiy, A. M.; Romyantsev, A. N.; Il'chenko, P. A.; Gol'denberg, A. L.

ORG: none

TITLE: A method for obtaining ethylene copolymers. Class 39, No. 175658

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 20, 1965, 66

TOPIC TAGS: polymer, copolymer, ethylene, olefin, chromium compound, catalyst, copolymerization, paraffin, cracking, petroleum

ABSTRACT: This Author Certificate presents a method for obtaining ethylene copolymers by copolymerizing ethylene with an α -olefin-containing compound at 60-130C and at a pressure of 30-40 atm in the presence of acid chromium catalyst. To simplify the technique of copolymerization, benzine distillate of rapid contact cracking of petroleum paraffins is used as the α -olefin-containing compounds.

SUB CODE: 07/ SUBM DATE: 07Feb63

BUR
 Card 1/1

UDC: 678.742.2-139

LEVICH, V.G.; BRODSKIY, A. M.

General theory of homogeneous-heterogeneous processes in moving media. Dokl. AN SSSR 165 no.3:607-610 N '65.

(MIRA 18:11)

1. Moskovskiy gosudarstvennyy universitet i Institut elektrokhemii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Levich).

KALINENKO, R.A.; BRODSKIY, A.M.

Kinetic scheme of ethane pyrolysis for optimization of
ethylene production processes. Kin.i kat. 6 no.5:916-921
S-O '65. (MIRA 18:11)

1. Institut neftekhimicheskogo sinteza imeni Topchiyeva
AN SSSR.

BRODSKIY, A.M.; LEVICH, V.G.

Rate of formation of surface deposits in an extensive chemical reactor. Dokl. AN SSSR 166 no.1:151-154 Ja '66.

(MIRA 19:1)

1. Moskovskiy gosudarstvennyy universitet i Institut elektrokhimii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Levich). Submitted July 16, 1965.

L 01238-67 EWT(m) JR

ACC NR: AT6031142

SOURCE CODE: UR/3136/66/000/066/0001/0024

AUTHOR: Aleksenko, Yu. N.; Brodskiy, A. M.; Zabelin, A. I.; Kevrolev, V. P.;
Lavrovskiy, K. P.; Makarov, D. V.; Tetyukov, V. D.; Fish, Yu. L.

42
B+1

ORG: none

TITLE: Analysis of tests of a unit for the atomic power station "Arbus"¹⁹ for
regenerating a gas oil coolant by degeneration hydrogenation

SOURCE: Moscow. Institut atomnoy energii. Doklady, IAE-1066, 1966. Analiz
ispytaniy ustanovki destruktivno-gidrogenizatsionnoy regeneratsii gazoylevogo
teplonositelya AES Arbus, 1-24

TOPIC TAGS: organic moderated reactor, organic coolant, atomic energy,
atomic power station, organic cooled nuclear reactor, catalyst, catalyst
regeneration/Arbus-I atomic power station

ABSTRACT: An analysis is made of data obtained in the experimental operation of
the "Arbus-I" atomic power station and related laboratory studies. The "Arbus-I"
differs from other atomic power stations using organic-cooled and-organic-moder-
ated reactors in that its gas oil coolant is regenerated by means of a hydrogenation-

Card 1/2

L 01238-67

ACC NR: AT6031142

degradation process. The investigation showed that regeneration through hydro-generation-degradation considerably decreases radiolytic losses in the coolant. The principal parameters for the regeneration of hydrostabilized gas oils are given and the useful life of the aluminocobalt molybdenum catalyst under adopted operating parameters is determined. Orig. art. has: 8 figures and 5 tables. [SF]

SUB CODE: 20/ SUBM DATE: none/

Card 2/2 awm

ACC NR: AP7003129

SOURCE CODE: UR/0204/66/006/004/0643/0646

REVIEWER: Brodskiy, A. M.

ORG: none

TITLE: Kinetika i Mekhanizm Termicheskogo Krekinga Alkanov (Kinetics and thermal cracking mechanism of alkanes) by A. D. Stepukhov, Part 1, Publishing House of the Saratov State University, 1965, 362 pp

SOURCE: Neftekhimiya, v. 6, no. 4, 1966, 645-646

TOPIC TAGS: alkane, chemical kinetics

ABSTRACT: The book's first chapter is devoted to the history of the development of ideas on the regularities of the thermal cracking of alkanes. Here the modern ideas on cracking as a complex homogeneous-heterogeneous radical-chain reaction are summarized. In the first and second chapters a review is presented on the data on the composition of the products of the thermal cracking of the simplest alkanes as a function of temperature, pressure, level of decomposition, presence of inhibitor or initiators, whose role was examined in very great detail in the original works of Stepukhov. The third chapter contains a detailed kinetic analysis of the mechanism of deep cracking with the consideration of various possibilities of the nucleation of radicals and their destruction in the contents and on the walls. 'Dintses-Frost'

Card 1/2

UDC: 665.531.001(049.3):547.21

ACC NR: AF7003129

equation which considers the cracking auto-inhibition effect and establishes the physical idea of the coefficients found in it is presented. This analysis permits an understanding of the cause of the qualitative likeness and definite quantitative differences in the cracking of different alkanes. The fourth chapter, in which the thermodynamics and kinetics of the basic elementary radical reactions occurring during cracking, include the reactions of substitution, addition, recombination, disproportionation, and isomerization of the radicals. The method of the approximate calculation of the steric factors of monomolecular and bimolecular reactions in relation to the temperature, based on the use of the transition state method, is set forth. /JPRS: 38,970/

SUB CODE: 07 / SUBM DATE: none

Card 2/2

BRODSKII, A. M.
Y

1987

GRAVITATIONAL RADIATION FRICTION. D. D. Ivanenko and A. M. Brodsii.
Doklady Akad, Nauk S.S.S.R. 75, 519-22(1950) Dec. 1. (In Russian)

It has been qualitatively shown by one of the authors (Ivanenko, Uspekhi Fiz. Nauk 32, No. 2, 3(1947) that, besides electromagnetic and meson friction that should be taken into account when formulating equations of motion of a single particle. These considerations are developed here and, in the framework of the classical theory, a computation is made of the deceleration produced by the radiation of gravitational waves in the case of a point particle; the approximation used can be called half-relativistic. The equation of motion employed is the equation of a geodetic line in a space distorted by its own gravitational field which is assumed to be weak and obeying Einstein's equations in a linear approximation. It may be noted that such an approach is applicable to other problems of gravitation, such as that of the gravitational vacuum.

BRODSKIY, A. M.

USSR/Astronomy - Gravitational Waves, 1 Oct 51
Stability

"Stability of Astronomical Systems," D. D. Ivanenko,
A. M. Brodskiy, I. P. Ginzburg, Moscow State U
niversity Lomonosov

"Dokl Ak Nauk SSSR" Vol LXXX, No 4, pp 565-567

The discussion of Einstein's gravitational field
can in a linear approximation be reduced by anal-
ogy to a discussion of other wave fields. In this
report the authors extend this analogy and intro-
duce the concept of temp and thermal radiation of

222133

a weak gravitational field. The derived representa-
tions are then applied for the purpose of clarifying
problems of stability of certain astronomical
systems. Crit temps are found for the various
planets and the sun. Submitted 4 Aug 51 by Acad
V. G. Fesenkov.

222133

BRODSKIY, A. (m.)

232T91

USSR/Nuclear Physics - Nonlinear
Field Equations 1 Jun 52

"Multiple Processes and Nonlinearity in the
Theory of Elementary Particles," D. Ivanenko,
A. Brodskiy, Moscow State U Imeni Lomonosov

"Dok Ak Nauk SSSR" Vol 84, No 4, pp 683-686

Analyzes collisions of nucleons with consequent
meson generation (cf. D. Ivanenko and V. Lebe-
dev, "Dok Ak Nauk SSSR" Vol 80, No 3, 1951) and

232T91

transfer of energy by particles. The possibil-
ity of particle conversion or of double beta-
decay introduces nonlinear field eqs. Re-
ceived 23 Apr 52.

232T91

U S S R .

48. On a non-linear quantum theory of the electron.
D. D. IVANENKO AND A. M. BRONSKII. *Zh. eksper.
teor. Fiz.*, 24, No. 4, 383-8 (1953) in Russian.
A non-linearity of the type $f_0(x)/\mu(x)$ is added to
the Lagrangian for the electron field in interaction
with radiation, given in the Heisenberg representation.
A canonical transformation removes the above term
and the ordinary non-linear term $A_0(x)/\mu(x)$. The
transformed equations obey free-field equations. The
introduction of the non-linear term has thus simply
changed the S-matrix and transitions between various
free-field states are produced by it. The non-linearity
leads to a renormalization of mass, but it is not shown
that a finite rest mass can be obtained. O. E. KERNYAN.

BB

BRODSKIY, A-M.

6 ply

U S S R .

Ivanenko, D., and Brodskii, A. Interaction of gravity with vacuum particles. Dokl. Akad. Nauk SSSR (N.S.) 92, 731-734 (1953). (Russian) I-F/W

A treatment of the interaction of the gravitational field with the vacuum of scalar and pseudoscalar particles (mesons) is based on the quantum theory of gravitation of the first author [see, e.g., A. Sokolov and D. Ivanenko, Quantum theory of fields, Gostehizdat, Moscow-Leningrad, 1952, Part II, Section 5; MR 14, 1044]. An expression is given for the Lagrange function of the problem, and used to derive the equations of motion and the commutation relations. It is then shown that one can determine an action function W of the problem. Explicit calculations are carried out under the assumption that the gravitational field is so weak that it can be described by linear equations. An iteration procedure is used to determine the action function W_0 for the vacuum in second approximation, that is the approximation which can be obtained with linear field equations. The calculation of higher approximations would require the use of non-linear field equations. The results obtained can be used to calculate the probabilities of effects which are due to the polarization of the vacuum, for instance, the formation of pairs of particles.

E. Gora.

IVANENKO, D.D., redaktor; BRODESKIY, A.M., [translator]

[Recent developments in quantum electrodynamics] Noveishee
razvitie kvantovoi elektrodinamiki; sbornik statei. Pod red.
D.D.Ivanenko. Moskva, Izd-vo inostrannoi lit-ry, 1954. 393 p.
(Quantum theory) (Nuclear physics) (MLRA 7:7)

BRODSKIY, A-M

1822

ON THE RENORMALIZATION IN MESON DYNAMICS. A

M. Brodskiy, Doklady Akad. Nauk S.S.S.R. 165, 893-92
(1965) Dec. 11. (In Russian)

The renormalization invariables of the reciprocity
constant and the mass in meson dynamics were calculated.
The calculations were based on Schwinger's values developed
for quantum electrodynamics. (R.V.J.)

mw
Sci

pm

28-PM

Brodskii, A.; Ivanenko, D.; and Korst, N. Difference of
masses of elementary particles. Dokl. Akad. Nauk
SSSR (N.S.) 105 (1955), 1192-1195. (Russian)
The question of the mass difference between two
particles of the same type, one of which is charged and the
other neutral is considered.

3

1. mostovskiy gosudarstvennyy universitet dr. N. N. Bogolyubovskiy.
Predstavleniyu Akademika N. N. Bogolyubovskiy.
(particles, elementary) (atomic mass)

BRODSKIY, A. M.

SUBJECT, - USSR / PHYSICS
AUTHOR BRODSKIY, A.

CARD 1 / 2

PA - 1987

TITLE On the General Theory of the Scattering of Mesons.

PERIODICAL Dokl. Akad. Nauk 111, fasc. 4, 787-790 (1956)

Issued: 1 / 1957

In the course of recent years the GREEN'S functions applying for one particle were represented in form of the integrals of some scalar functions, on which occasion very general theoretical functions were taken as a basis. At first the expression for the renormalized nucleon- and meson functions found by H. LEHMAN and M. GELL-MANN as well as F. E. LOW was written down in a form that was suitable for the present investigation. In this as well as in all the following formulae all quantities are assumed to be renormalized. The amplitude of scattering by nucleons is now to be expressed by certain integrals which are fully analogous to those occurring in the above formula. There follows momentum representation, and the general conditions which must be satisfied by certain scalar functions are investigated. Also here the well-known result is obtained that one of the aforementioned scalar functions has poles only for the "real" intermediary states (in which the law of the conservation of energy holds good). The rule for rotation round the poles is obtained on the basis of the causality principle. The expressions for the poles are written down.

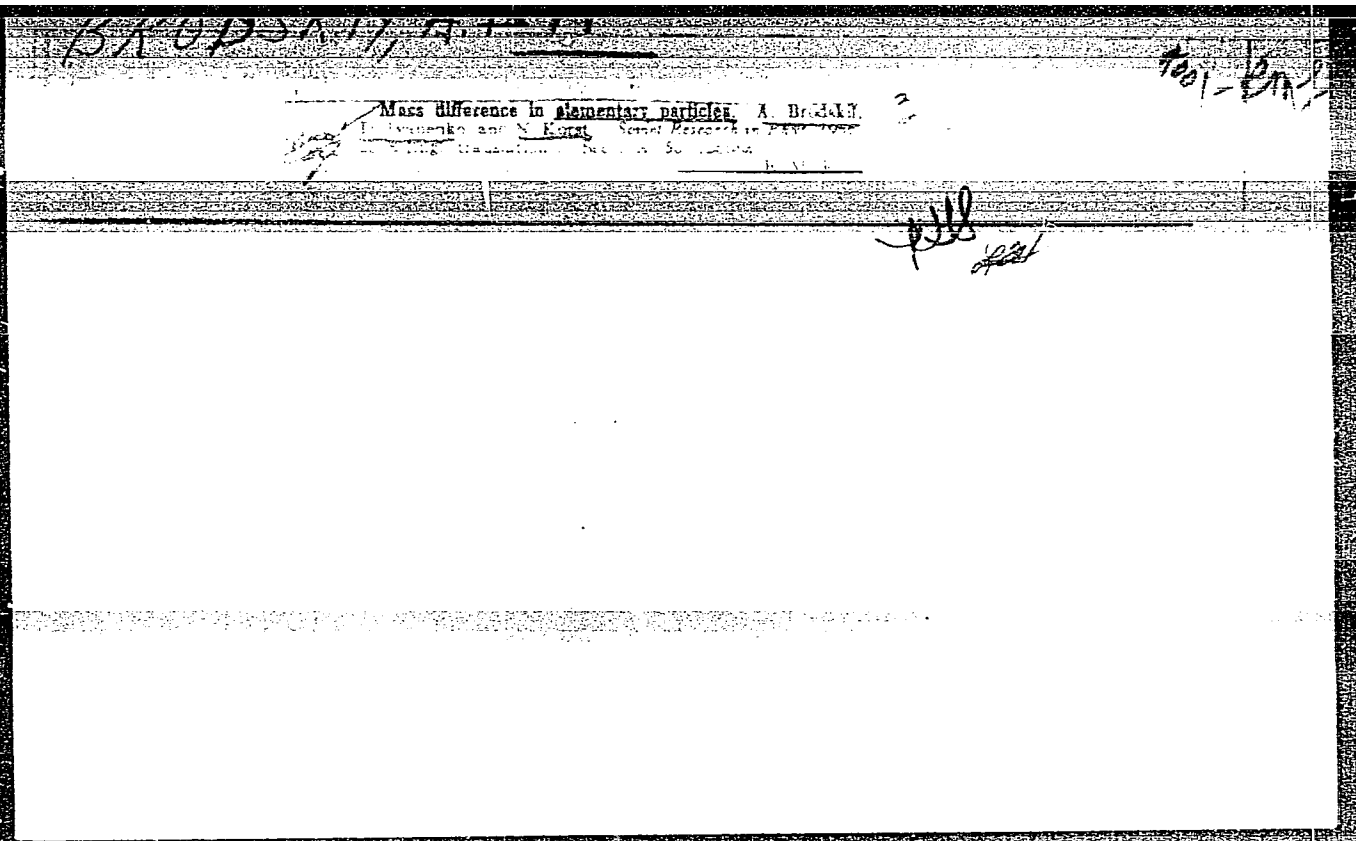
Proceeding from very general assumptions the author introduced 4 functions of 2 parameters which describe scattering completely. On this occasion the

Dokl.Akad.Nauk 111,fasc.4, 787-790 (1956) CARD 2 / 2 PA - 1987

dependence on momenta is separated in a high degree, which makes it possible to make some advance statements as to the behavior of the scattering cross section without a concrete assumption of the form of interaction being necessary.

Next, the conditions are mentioned by which the connection between the different spectral functions of GREEN'S functions for one and for two particles are determined. SCHWINGER'S equation and an additional causality condition serve as a basis for this purpose. The here adopted system of writing the scalar functions by using parameters of the type of an eigentime makes it possible, when integrating over the momenta, to avoid a number of difficulties connected with divergencies. Another condition is connected with the half-sums of the limiting values, for each of these half-sums must be equal to zero. The conditions mentioned here establish a connection between the residues of one of the aforementioned scalar functions in the various poles.

INSTITUTION: Moscow State University



Bronskii, A. On the general theory of scattering of
mesons. Dokl. Akad. Nauk SSSR (N.S.) 171
767-769 (Russian)

The theory of scattering of mesons is
formulated in terms of renormalized

Nov. 21, 1954 (1954) (N.S.)

B. L. Hui (Minneapolis, Minn.)

Moscow State U. in Leningrad

1str: 1E3a/4E1b

4387

ON THE DERIVATION OF THE ...

3 em:

AUTHOR
TITLE

BRODSKIY A.M.

PA - 2988

On the Derivation of the Equations developed by Low
in the Theory of the Scattering of Mesons.

(K vyvodu uravneniy LOU v teorii rasseyaniya mezonov.-Russian)

PERIODICAL

Zhurnal Eksperim. i Teoret. Fiziki 1957, Vol 32, Nr 3, pp 616-617
(USSR).

Received: 6/1957

Reviewed: 7/1957

ABSTRACT

The present paper gives a new derivation of Low's equations.
They may then be written down in a form in which the concrete
form of interaction is expressed in a simple manner by an in-
homogeneous term. The author examines the scattering of pions
by nucleons and for this purpose he introduces a scattering
amplitude (T-matrix) which is connected with the corresponding
matrix element of the s-matrix as follows:

$$(p'\sigma', k'j | S | p\sigma, ki) = \delta_{\sigma\sigma'} \delta_{ij} \delta(\vec{p}' - \vec{p}) \delta(\vec{k} - \vec{k}') - \\ -(2\pi i) \left[(2\pi)^3 2k'_0 2k_0 \right]^{-1/2} \delta(p' + k' - p - k) (p'\sigma', k'j | T | p\sigma, ki)$$

Here $p, k(p', k')$ denote the momenta of the incident (scattered)
nucleon and meson at $-\infty (+\infty)$. These momenta satisfy the

CARD 1/3

PA - 2988

On the Derivation of the Equations developed by Low
in the Theory of the Scattering of Mesons.

relations $p+k = p' + k'$, $p^2 = p'^2 = m^2$, $k^2 = k'^2 = -\mu^2$, where m
and μ denote the experimental masses. Also all other quantities
are regarded as renormalized.

From the definition of the scattering amplitude and from the
unitarity of the S-matrix there immediately follows the
relation:

$$\{T - T^\dagger\} = \left[(p'\sigma', k'j | T | p\sigma, ki) - (p'\sigma', k'j | T^\dagger | p\sigma, ki) \right] = \\ = -2\pi i \sum_n \int dp_n (n | T | p'\sigma', k'j)^\dagger (n | T | p\sigma, ki) \delta(p_n - p - k)$$

where $p+k = p' + k'$ must appear on the right side. $a(n)$ here
denotes the entire set of the states and as such a set the
system of eigenfunctions of the energy momentum vector P in
infinity with the eigenvalues $P^2 = p_n^2$ is selected.

Further, the general form of the scattering amplitude is used.
Further observations are carried out in the laboratory system
of the coordinates ($p = (m, 0)$). In this case the following
inequations apply:

CARD 2/3

PA - 2988

On the Derivation of the Equations developed by Low
in the Theory of the Scattering of Mesons.

$$(p - k')^2 + M_1^2 = - (m + \mu)^2 + 2 m (k_0' + \mu) + M_1^2 > 0; (p+k)^2 + \\ m^2 = - 2mk_0 - \mu^2 < 0; (p-p')^2 + M_2^2 = - 2 m(m - p') + M^2 > 0.$$

Eventually, a formula is obtained which corresponds to the
first equation of the infinite system of equations by Low.
(No illustrations)

ASSOCIATIONS: Moscow State University

PRESENTED BY: -

SUBMITTED: 27. 11. 1956.

AVAILABLE: Library of Congress.

CARD 3/3

Distr: $4E3d/4E4c$

3849

A NEW POSSIBILITY IN NEUTRINO THEORY A.M.

Brodskii and D. D. Ivanenko (Moscow State Univ.) Zhur

Exptl. i Teoret. Fiz. 33, 910-12 (1957) Oct. (In Russian)

In addition to the usual description of electrons and other fermions by means of second type spinors, it is suggested that, for the neutrino, use can be made of Cartan spinors of the first type with other transformation laws in reflection. Despite the conservation of parity, a number of conclusions of such a theory are analogous to the Yang-Lee theory (for author).

AUTHOR: Brodskiy, A. M.

SOV/56-34-6-21/51

TITLE: ~~On the Dispersion Relations and on the Deduction of the Equations~~
for the Scattering of K-Mesons (O dispersionnykh sootnosheniyakh
i vyvode uravneniy dlya rasseyaniya K-mezonov)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
Vol. 34, Nr 6, pp. 1531-1538 (USSR)

ABSTRACT: This paper investigates the scattering of K-mesons on nucleons with account of the production of Ξ -particles; it uses the usual principles of the standard theory, the causality and the unitarity of the S-matrix. The non-trivialities which arise when one changes over from the scattering of pions to the scattering of K-mesons are caused mainly by the behaviour of the K-mesons with respect to the transformations in coordinate spaces and in isotopic spaces. One has to take into account from the beginning also the interaction with the particles which do not participate immediately in the scattering (in particular Σ , Λ and also pions). Moreover, one has to take into account the relativistic effects more carefully. The effects of the weak interactions are not considered. In the four-dimensional

Card 1/3
2

SOV/56-34-6-21/51

On the Dispersion Relations and on the Deduction of the Equations for the Scattering of K-Mesons

isotopic space the Ξ -particles and the K-mesons may be described by isotopic spinors with 4 components. The calculations are discussed step by step. The type of the interaction is represented by an inhomogeneous member in the equations. The obtained equation is the first equation of the system of the infinite equations for the scattering amplitudes (of the type of the relativistic Low (Lou) equations). For sufficiently low energies one obtains a closed integral equation. This equation corresponds simply to the dispersion relation and the type of the interaction is represented by an inhomogeneous term. The investigation of the scattering of the K-mesons by means of equations of the Low (Lou) type allows to obtain important conclusions concerning the structure of the isotopic space. The author thanks D. D. Ivanenko, Professor, for his interest in this paper and M. K. Polivanov for his remarks. There are 3 figures and 10 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

Card 2/5

2

AUTHORS: Ivanenko, D., Brodskiy, A. SOV/20-120-5-18/67

TITLE: On Non-Linear Theory of Elementary Particles (K nelineynoy teorii elementarnykh chastits)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 5, pp. 995 - 998 (USSR)

ABSTRACT: This is a study of a non-linear generalization of the Dirac (Dirak) equation for a quantized spinor field. The invariants can be obtained by a method described already earlier by the authors (Ref 2). This method is characterized by setting equal all spinor fields in the expression for the interaction of two Fermion pairs (as, for example in the theory of β -decay). The method is based upon the hypothesis of universal interaction and the description of matter by a uniform "world spinor". The Lagrangian corresponding to these conceptions is written down. In the not quantized theory a number of relations exists between the terms of this Lagrangian. A few of the non-linear terms apparently are identically equal to zero. The spinor ψ is then transformed to a form, in which every particle is described by a two-component hall-spinor. This investigation is limited to a certain non-linear part of the Lagrangian. The field

Card 1/3

On Non-Linear Theory of Elementary Particles

SOV/20-120-5-18/67

equations resulting from a variation of the Lagrangian are given. The problem of an ansatz for the equations of the causal propagation functions for this non-linear Lagrangian is discussed by the authors. In order to solve this problem additional terms with fictitious sources are introduced into the Lagrangian. An operator for the mass M is also introduced, taking into account the translation invariance of the kernels. The equation for the causal kernel in the non-linear case in the absence of external fields is equivalent to the equation for the linear case, if an interaction with the boson vacuum of an "electromagnetic" and of a "boson" type with the field mass and with the "bare mass" is assumed. From the considerations presented the addition of non-linear terms in the case of a free particle is effectively reduced to a modification (or the introduction) of a mass. When a two-particle kernel is considered the equations of non-linear theory cannot be distinguished by their appearance from the equations of linear theory with a boson field. According to the results obtained the boson fields can in the non-linear theory be considered as a result of the unification of the "primary" spinors as in a

Card 2/3

On Non-Linear Theory of Elementary Particles

SOV/20-120-5-18/67

fusion. The authors express their gratitude to Professor B. Heisenberg (Geyzenberg) for his friendly note on new interesting results of non-linear theory. There are 8 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova
(Moscow State University imeni M.V.Lomonosov)

PRESENTED: April 9, 1958, by N.N.Bogolyubov, Member, Academy of Sciences,
USSR

SUBMITTED: April 7, 1958

1. Beta decay---Theory 2. Particles---Mathematical analysis

Card 3/3

BRODSKII, A.N. [Brodskiy, A.M.]; IVANENKO, D.; SOKOLIK, H.A. [Sokolik, G.A.]

A new conception of the gravitational field. Acta phys Hung 14 no.1:
21-25 '62.

1. Faculty of Physics, Moscow State University, Moscow, USSR.

BroDs kiy, A.

21(1,8); 24(5) P.2

PHASE I BOOK EXPLOITATION

SOV/3369

Vsesoyuznaya mezhvuzovskaya konferentsiya po kvantovoy teorii poley i teorii elementarnykh chastits. Uzhgorod, 1958

Problemy sovremennoy teorii elementarnykh chastits. No. 2: Trudy konferentsii... (Problems in the Modern Theory of Elementary Particles. Nr. 2: Transactions of the All-Union Inter-Vuz Conference on the Quantum Field Theory and the Theory of Elementary Particles) Uzhgorod, Zakarpatskoye oblastnoye izd-vo, 1959. 214 p. 5,000 copies printed.

Ed.: Yu. Lomsadze, Docent; Tech. Ed.: M. Belous.

PURPOSE: This book is intended for physicists, particularly those concerned with problems in the field of elementary particles and the quantum theory.

COVERAGE: This book contains articles on elementary particles originally read at the All-Union Inter-Vuz Conference held at Uzhgorod State University on October 26, 1958. Among the topics

Card 1/6

Problems in the Modern Theory (Cont.)

SOV/3369

discussed are: the spinor field theory, the fusion theory, Lorentz contractions, parity studies, nucleon-nucleon scattering, etc. English abstracts accompany each article. References follow each article.

TABLE OF CONTENTS:

Foreword	3
Ivanenko, D., and A. Brodskiy. Remarks on the Unified Non-Linear Spinor Field Theory	5
Barashenkov, V.S. Multiple Formation of Particles in Experiments With 9-Bev Protons on the UNIR Phasotron	10
Borgardt, A. Continuation of Wave-Field Functions Into the Region of Non-Linear Self-Action	20
Sokolik, G.A. New Formulation of Fusion Theory	26
Card 2/6	

Problems in the Modern Theory (Cont.)	SOV/3369
Lomsadze Yu.M., and B.I. Maksimov. Application of Schwinger's Variation Method to the Pair Theory	30
Sokolik, G.A. Generalization of the Lorentz Group	37
Ivanitskaya, O.S. Generalized Equivalent Potential and the Sequence of Infinitesimal Lorentz Contractions Under Rotary Motion	44
Sokolik, G.A. Representation of the Complete Lorentz Group	52
Sokolik, G.A. Connection Between the "Anomal" Representation of the Space-Time Inversion Group and the Pauli Transformations	56
Geshkenbeyn, B.V., S.A. Nemirovskaya, and A.P. Rudik Non-Conservation of Parity in RaE	58
Bilen'kiy, S.M., and R.M. Ryndin. Determination of Parity of Strange Particles	63
Card 3/6	